REMARKS

The applicants have had an opportunity to carefully consider the USPTO Office Action of December 6, 2005 and believe this amendment is fully responsive to every point raised in the Office Action. Reconsideration is respectfully requested of the rejections made with respect to this application. Claims 1-36 remain in the application after this amendment is entered.

THE OFFICE ACTION

Claims 1-36 stand rejected under 35 U.S.C. §102(b) as being anticipated by Wavelet Transform Adaptive Signal Detection, a PhD Dissertation by Wensheng Huang to North Carolina State University (Huang).

THE ART REJECTIONS

Claims 1-36 Patentably Distinguish Over Huang.

The applicants respectfully submit that claims 1-36 and the Huang reference are directed to fundamentally different aspects of process control. In summary, claims 1-36 are directed to decomposing and transforming an error signal using orthogonal functions in a manner that provides multi-resolution processing of the error signal to produce a control signal. In contrast, the focus of Huang's work is on signal detection using adaptive filtering. Notably, Huang does not disclose or fairly suggest any aspect of processing the error signal to produce a control signal.

Generally, Huang provides various techniques for de-noising a signal *x(n)* (e.g., a detected signal or any noisy signal) to form an actual output signal *y(n)*. In one technique, a detected signal *x(n)* is separated into several sub-bands using wavelet decomposition (page 37; Figure 20). These sub-band signals are then subsequently processed, weighted, and reconstructed to form the output signal *y(n)* (page 37; Figure 20). Separately, the signal *e(n)* is also separated into several corresponding sub-bands using wavelet decomposition (page 37; Figure 20). These error signal sub-band signals are then subsequently processed and provided to corresponding least mean square (LMS) algorithms (page 37; Figure 20). The outputs of the LMS algorithms from the error signal sub-bands are applied to the weights associated with corresponding detected signal sub-bands to minimize the noise in the resulting actual output

signal *y(n)*. This adjustment of weights, either at every sample or a block of samples, is the reason Huang named the technique wavelet transform adaptive filter (WTAF). Simply put, error in WTAF is a representation of the noise content of, for example, a given detected signal. The weights of the wavelet transform filter may be adapted using error signal sub-bands so that the noise error in the detected signal is minimized.

In pertinent part, the focus of the Huang reference is on "**signal detection**" using various types of waveform transform adaptive filters (WTAFs), which is evident from the title "Waveform Transform Adaptive Signal Detection." One of Huang's WTAFs is characterized by decomposing an output error signal *e(n)*, which is the difference between a desired signal *d(n)* and an actual output signal *y(n)*, to create sub-band error signals (pages 36 and 37, Figure 20). Huang applies the sub-band error signals to corresponding least mean square (LMS) algorithms (page 37, Figure 20).

The result from the LMS algorithms in Huang is provided to corresponding sub-band signals for the decomposed actual output signal *y(n)* to adjust the weights in the scale domain (i.e., *w(n)*) of the adaptive filter for processing the actual output signal (page 37, Figure 20). Huang refers to this technique as sub-band error based WTAF with the output error signal decomposed (page 37, Figure 20). Notably, the sub-band error signals are "transform[ed] ... to provide ... control signal components" or "summ[ed] ... to form the control signal" as recited in independent claims 1, 19, 35, and 36. In fact, Huang does not disclose any aspect of processing the error signal to produce a control signal. Based on the foregoing, the applicants respectfully submit that amended independent claims 1, 19, 35, and 36 and claims dependent thereon (i.e., claims 2-18 and 20-34) are currently in condition for allowance.

The applicants respectfully submit that claims 2-5 and 20-23 are patentably distinct from Huang for at least the same reasons above distinguishing claims 1, 19, 35, and 36 from Huang. Additionally, Huang does mention the terms differentiation (claim 3) and integration (claim 4), but does not appear to do so in the context of Figure 20 relied upon to reject claim 1, and also does not appear to do so in the context of transforming any error signal component.

Likewise, for at least the same reasons above distinguishing claims 1, 19, 35, and 36 from Huang, the applicants respectfully submit that claims 6-12 and 24-29 are patentably distinct from Huang. Additionally, Huang discloses a linear adaptive filter rather than a linear function (e.g., claim 6) and a non-linear mechanical system rather than a non-linear function (e.g., claim 7). In

regard to claim 8, Huang teaches that sub-band error based WTAF with error signal decomposition results in processing delays and is not suitable for real-time applications (page 37). As stated above, Huang does not disclose any algorithm for a control signal, for example, such as the algorithm identified in claim 12.

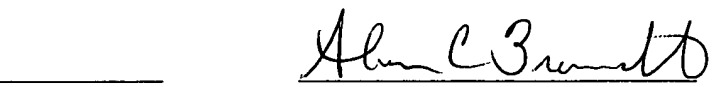
Additionally, the applicants respectfully submit that claims 13-18 and 30-34 are patentably distinct from Huang for at least the same reasons above distinguishing claims 1, 19, 35, and 36 from Huang. Moreover, the citations to Huang refer to an adaptive filter using a block of data which is inconsistent with the use of time and frequency functions (e.g., claim 14), (de/dt)Kd and Kp (e.g., claim 15), emulating a PD controller output (e.g., claim 16), (de/dt)Kd, (1/s)Ki, and Kp (e.g., claim 16), and emulating a PID controller output (e.g., claim 18).

CONCLUSION

Based on the foregoing remarks, the applicants believe that all of the claims in this application (i.e., claims 1-36) are now in condition for allowance and an indication to that effect is earnestly solicited. Furthermore, if the USPTO believes that additional discussions or information might advance the prosecution of this application, the USPTO should feel free to contact the undersigned at the telephone number indicated below.

Respectfully submitted,

Date: May 4, 2006



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